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ABSTRACT

In order to clarify the complicated relationship between the onset of puberty and the transition from elementary to junior high school, a controlled study was designed that compared the transition of grade 5 elementary school students to grade 6 in an elementary school with the transition of grade 6 elementary school students to grade 7 in a junior high school. Two sets of measures are reported. One set consists of children's perceptions of their competence in three domains that are important for their adjustment in school (i.e., their perceptions of their cognitive competence in academic matters, their social competence in peer relationships, and their physical competence in sports and outdoor games) plus their perceptions of their general competence, representing a measure of self-esteem. The second set of measures reported consists of teachers' ratings of the children's competence in the same areas. The scales were administered three times: once prior to transition, toward the end of the school year, and twice after transition -- about 10 weeks into the next school year and again toward the end of that school year. Findings reported in this paper focus on 226 children in the longitudinal sample for whom data was available at all three times of measurement. Discussion centers first on the effects of transition on this entire group of children and then on the effects of physical maturity and transition on a subsample of these children. (Author/RH)

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Children's Adjustment in School:

The Interaction of Physical Maturity and School Transition

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Paper presented at the annual meeting of the American Educational Research Association, New York City, March 20, 1982, in a symposium, "Individual Differences and School Structures Affecting the School Transitions of Early Adolescents," Bruce Mackenzie-Haslam, Chair.

A number of investigators have proposed that children's transition from elementary school to junior high school has significance beyond environmental change -- among others, Dr. Hamburg (Hamburg, 1974) and the authors of the earlier presentations at this symposium (Simmons, Rosenberg, & Rosenberg, 1973; Simmons, Bulcroft, Blyth, & Bush, 1979; Simmons, Blyth, and McKinney, in press). They have proposed that in our society, which defines adolescence more in terms of cultural than biological events, the transition from elementary school to junior high school has become a convenient developmental marker for the transition from childhood to adolescence. Thus, it introduces major change into children's lives. Once in junior high school, it is expected that they will assume the social role of adolescents and conform to demands for increased academic and social competence -- both in and outside school. For the children themselves -- and their parents, teachers, and peers -- this transition has come to represent a rite of passage.

The biological events of adolescence, of course, continue to play an important role. They begin to affect children about this time. However, onset and rate of pubertal change vary widely, according to individually set biological clocks. Their impact therefore is likely to be less uniform than culturally synchronized transitions. To some degree, awareness of pubertal change should be heightened in all children when they join a student body consisting of older, physically more mature children; but the impact of school transition is likely to be greatest for pubescent children who must cope with their changing bodies and their their developing sexuality, in addition to the demands of their new physical and social school environment. It has been suggested, in fact,

that transition from elementary school to junior high school represents a "sharp discontinuity" in children's lives because it occurs during this sensitive period of development -- a time of important biological change. As you no doubt know, puberty begins for girls, on the average, about a year to a year and a half before it begins for boys, which means that more girls are likely to be undergoing pubertal change as they are making the transition from elementary to junior high school. It follows that girls should be more likely than boys to experience this "sharp discontinuity".

Research findings support these positions. The research of Simmons and her colleagues shows that transition to junior high school is more difficult than later transitions to secondary school and that indeed it is more difficult for females, especially early maturing females, than for boys. Anne Petersen and her students at Chicago have found that not only early, but also late maturing girls -- all girls who are "off time" -- tend to have difficulty with puberty (Wilen, 1980). Their research suggests that it is very important for girls to be "on time", or in synchrony with the majority of their peers. Earlier research focusing on early and late maturation in later adolescence also indicated that early puberty is difficult for females, and suggested further that late onset of maturation is problematic for males (Mussen & Jones, 1957; Jones & Mussen, 1958). The lag between girls and boys in the onset of puberty contributes toward the awkwardness of being an early maturing girl, ahead in physical maturation of most girls and almost all boys in her age group, and being a late maturing boy, behind in physical maturation of most boys and all girls in his age group.

Clearly, puberty complicates the school transition picture. The study on which I am reporting today was designed to contribute to its clarification. It compares transition one year earlier, from 5th grade in elementary school to 6th grade in middle school, when children are about 11 years old, with transition from 6th grade in elementary school to 7th grade in junior high school. Puberty is less likely to play a role in the earlier transition. The design of the study is shown on Table 1 of your hand-out.[1] You will note that same-age children who did not make a school transition at the same time were included in comparison, or nontransition, groups. Ignore the control groups -- they will not be considered in this presentation.

I am reporting today on two sets of measures. One set consists of children's perceptions of their competence in three domains that are important for their adjustment in school; i.e., their perceptions of (a) their cognitive competence, in academic matters, (b) their social competence, in peer relationships, and (c) their physical competence, in sports or outdoor games; plus their perceptions of their general competence, which represents a measure of self-esteem. The other set consists of teachers' ratings of the children's competence in the same areas. These measures were obtained with carefully constructed companion scales that were developed by Susan Harter, The Perceived Competence Scale for Children and Teacher's Rating Scale of Child Actual Competence (cf. Harter, 1982).

In order to assess the impact of school transition, the scales were administered three times: once prior to transition, toward the end of the school year, in the old school; and twice after transition, about

ten weeks into the next school year and again toward the end of that school year, in the new school. It was expected that the increased demands for academic and social competence in middle and junior high school should be reflected in differences between pre- and post-transition teacher ratings and that the impact of transition, including these demands, should be reflected in changes in children's perceptions of their competence from pre- to post-transition times of measurement. More specifically, it was expected that teachers in middle and junior high school would use the range of competence observed in the behavior of middle and junior high school students in general as a standard to rate the competence of new students; and it was expected that children's self-perceptions would reflect their feelings about their relative ability to meet increased academic demands, to establish and maintain peer/social relationships in the new school environment, and to hold their own in sports and outdoor games that are part of school life, as well as their feelings about their general competence. It was expected further that if the transition introduced major change into their lives, the self-assessments of children in the transition groups should show greater change from the first to the second time, and possibly to the third time of measurement, than those of children in the comparable non-transition groups. Self-assessments of children in the groups remaining in the same school and also their teachers' competence ratings were expected to remain relatively stable across the one-year period. As to physical maturation, it was expected to have less impact on children in the younger than on children in the older transition group. Also, it was expected to have less impact on children in the nontransition groups, who were not burdened by other changes at the same time.

The focus of my report is on the 226 children in the Longitudinal Sample for whom we have data at all three times of measurement. First, I'll talk about effects of transition on this entire group of children and then about effects of physical maturity and transition on a subsample of these children.

In order to examine physical maturity in interaction with school transition, extreme groups consisting of the least and most mature children in the longitudinal sample were created -- a total of 55 children. As physical measures were limited to height and weight, the simple height over weight ratio familiar to runners was used to establish children's physical maturity status for assignment to these groups. This was done only after the height and weight measures were plotted against National Center for Health Statistics male and female height-for-age and weight-for-age norms and found to cluster around the 50th percentile of these norms; and it was done after the height/weight ratio curve based on these NCHS norms was drawn for children from ages 6 to 18 and found to show a steady decrease through the mid-teens, leveling out in late adolescence, that reflects the earlier approach to mature status by females from about age 11 through 13.5, when boys begin to catch up. It's included in your hand-out. Height/weight ratios were used to identify those children who were behind, or one standard deviation above, and those children who were ahead, or one standard deviation below, their peer group in approaching mature height/weight ratio status and assigned respectively to the "less mature" and "more mature" extreme groups.[2] As children in this age group tend to be sensitive to their relative height (males) and weight (females),

we are examining also their perceptions of their competence and their self-esteem in relation to these two measures separately. In addition, we are planning to examine children's self-perceptions in relation to the widely used Quetelet or ponderal index (Weight/Height^2).

The use of this simple height/weight ratio has some support from its favorable relationship, in the expected direction, with other data that we have for 35 of the 55 children (63%) in these extreme groups -- children who participated in another phase of the study. The additional data include parents' and interviewers' ratings of the children's pubertal status and children's perceptions of their being "off" or "on time" in relation to their peer group. With one exception, all of these children also were rated by interviewers on attractiveness as average to very good looking. Some of the "more mature" children were rated as "chubby," but none as heavy or obese.

What are the findings? When you consider the entire longitudinal sample of 226 children, it appears that children's perceptions of their competence were not affected by school transition. They were relatively stable across the one-year period, even though significant differences between pre- and post-transition teachers' ratings provide evidence that children in the transition groups faced increased demands for academic, social, and physical competence. Comparison in the transition group of children's and teachers' ratings led to an astonishing finding, however; namely, that the differences between children's self-assessments and teachers' ratings were much larger pre- than post-transition. This is astonishing, because it suggests that in evaluating their competence the children used higher standards than their elementary school classroom

teachers, who presumably knew them quite well. Pre- and post-transition, these children used standards similar to those employed by their teachers in middle and junior high school. It seems that the children were prepared for and may even have anticipated the challenges provided by their new school environment. A summary of significant results related to transition is presented in Table 2 of your hand-out.

I should like to mention at this point that, like Harter (1982), we found high internal consistency for all cognitive, social, physical, and general competence subscales. Among children, social and physical competence were highly related, and children's general competence was related to each of the other three subscales. Among teachers, cognitive and general competence were most highly related. Correlational analyses revealed convergence between children's and teachers' ratings to be highest for cognitive and lowest for general competence. Convergence with teacher ratings was greater for boys than for girls. Whereas boys tended to rate themselves somewhat more positively than their teachers, girls consistently rated themselves less positively than their teachers -- most dramatically in general competence, or self-esteem. In part, greater differences between teachers' ratings and girls' self-assessment can be attributed to teachers' giving higher ratings to girls than boys. It appears, however, that generally boys over-estimated and girls under-estimated their competence. This finding is similar to reports in the achievement literature.

When we turn to examine the results for only the children who were identified by their height/weight ratio as less or more physically mature than their peers, the picture changes from that obtained for

the entire longitudinal sample. There were significant physical maturity and transition effects -- for children's self-assessments, as well as teacher ratings, and also for differences between these two measures. Significant results related to these effects are presented in Table 3 of your handout.

In children's self-ratings, there was a physical maturity effect for cognitive competence, in interaction with sex, which fits in perfectly with the research literature about early and late maturation. It was not related to the children's grade level or to transition. Both "more mature" boys and "less mature" girls saw themselves as more competent in academic matters than their counterparts -- the "less mature" boys and the "more mature" girls.

There was a similar significant physical maturity effect for social competence, in interaction with transition and with the children's sex. In the transition group, social competence self-ratings of "more mature" boys and "less mature" girls, respectively, were higher than those of "less mature" boys and "more mature" girls. In the nontransition groups, the obverse was found for boys; that is, the "more mature" boys rated themselves much lower than the "less mature" boys. As the nontransition group included 6th-graders advancing into 7th grade in middle school along with 5th-graders advancing into 6th grade in elementary school, this finding can be attributed only in part to feelings about being conspicuously different as early maturers in elementary school. The mean social competence scores for these two nontransition groups, in fact, indicate that the older "more mature" boys in middle school rated themselves much lower than the younger "more mature" boys in elementary school.

As you would expect, there was a comparable significant physical maturity effect for physical competence in school-related sports and outdoor games, in interaction with grade and transition -- as well as with grade and sex. It indicates that "less mature" boys and, in particular, "more mature" girls in the transition groups rated themselves as quite low in physical competence. In the nontransition group, in contrast, "less mature" girls rated themselves lower than "more mature" girls. As the nontransition group included 5th-graders advancing into 6th grade in elementary school along with 7th grade in middle school, this finding cannot be explained entirely by "less mature" girls' seeing themselves as less competent in sports than most of the other girls in middle school. However, the group mean physical competence scores for the older "less mature" girls in middle school were lower than those for the younger "less mature" girls in elementary school.

The teacher ratings of these children's cognitive and social competence followed the pattern obtained for the entire Longitudinal Sample: Significant Time x Transition effects revealed that teacher ratings were substantially lower post-transition for the transition groups and that, in contrast, the nontransition groups received somewhat higher ratings across time. In other words, as a group, these children were not seen as different in cognitive or social competence from their peer group. However, the significant physical maturity effect for physical competence in interaction with time and sex shows that "less mature" males and "more mature" females in particular were rated lower <u>after</u> the first time of measurement, when all children except those in the younger nontransition group were in either middle or junior high school. It appears that teachers are influenced by the relative physical maturity of students only in their ratings of physical competence, on which

it may have a direct effect.

Finally, a comparison of child and teacher ratings reveals that the degree of post-transition convergence found in the larger sample for the transition groups was not achieved uniformly in the extreme groups subsample. While it did hold for the transition groups for cognitive competence, for social competence the same degree of convergence was obtained only for "less mature" and for physical competence only for "more mature" children.

You will note that significant 5-way interaction effects were obtained both for teacher ratings and for differences between child and teacher ratings of general competence, or self-esteem. All I want to say at this time is that teacher ratings across time differ substantially, often in a curvilinear fashion -- particularly for the transition groups. Without consulting data not completely processed at this time I am hesitant to discuss them in terms of short- versus long-term effects, because we are dealing with a small number of subjects in each of the 16 cells across the three times of measurement. A general statement that can be made about the differences between child and teacher ratings is that, on the whole, the children in these extreme groups tend to see themselves as quite a bit less competent than their teachers see them.

To summarize, then, the study offers no evidence for direct transition effects on children's adjustment in school, as reflected in their perceptions of their cognitive, social, physical, and general competence, when you consider all the children in the Longitudinal Sample. What it does indicate is that elementary school teachers give higher ratings to children preparing to leave elementary school than middle and junior high school teachers give to incoming students. This finding suggests that teachers more so than the children themselves assess competence in relation to overall school context,

which, on the one hand, favors children at the top of the age hierarchy, who on the average presumably also are at the top of the competence hierarchy (here, in elementary school) and, on the other hand, puts at a disadvantage children at the bottom of the age hierarchy, who on the average presumably also are at the bottom of the competence hierarchy (here, in middle and junior high school).

A transition effect does emerge, however, when you consider only the children who are "less mature" or "more mature" in relation to their peer group -- or, for transition in interaction with physical maturity. It is evident not in children's perceptions of their cognitive competence -- the relationship between physical maturity and children's perceptions of their cognitive competence was the same in transition and nontransition groups -- but in their perceptions of their social and physical competence, which are likely to be most critical for successful peer relations and consequently important for their general adjustment in school as well as outside of school (Hartup, 1977). These findings provide some support for all the positions on the effects of early and late maturation mentioned earlier and indicate that these effects extend downward to children changing from 5th to 6th grade at about age 11. Being "off time" at the very beginning of adolescence, particularly for "less mature" boys and "more mature" girls, appears to dampen children's perceptions of their competence, such that they are much more negative than their teachers' ratings. The findings indicate that school transition and assumption of the social role of adolescents is likely to be problematic primarily if it coincides with, or is superimposed on, the experience of the physical changes of puberty, in the case of girls, or the experience of relative lack of physical change, in the case of boys.

Given that we cannot synchronize children's biological clocks, in order to lessen the individual differences that result from physical maturation, it seems that we might be able to soften the impact of puberty and the negative social comparison effects on the self-perceptions of children who are "off time" by helping all children to understand (a) that the process of physical maturation during adolescence is idiosyncratic in onset and rate of progression toward mature status, and that, therefore, it is completely "normal" throughout adolescence to have a wide range of biological ages at each chronological age; and (b) that eventually in later adolescence, individual differences in physical maturity will disappear. The findings of this study indicate that by the time children are in 6th grade they could profit from such information and discussion of the changes that are beginning to take place for some girls and boys in their peer/age group, but which are ahead for all of them.

Reference Notes

1. The study was conducted in the Montgomery County, Maryland, Public School District. The sample consists of student volunteers, who according to school personnel are representative of the student population. While the sample includes minority students and students of working-class background, it is made up primarily of white students and students of middle-class background.
2. Dr. Dale Blyth found this standard deviation height/weight ratio measure of early and late maturation to correlate significantly with the measure of early and late development used in the study on which he is collaborating with Dr. Roberta Simmons, which is based on ~~onset of~~ menarche for girls and peak growth period for boys (personal communication, 1982).

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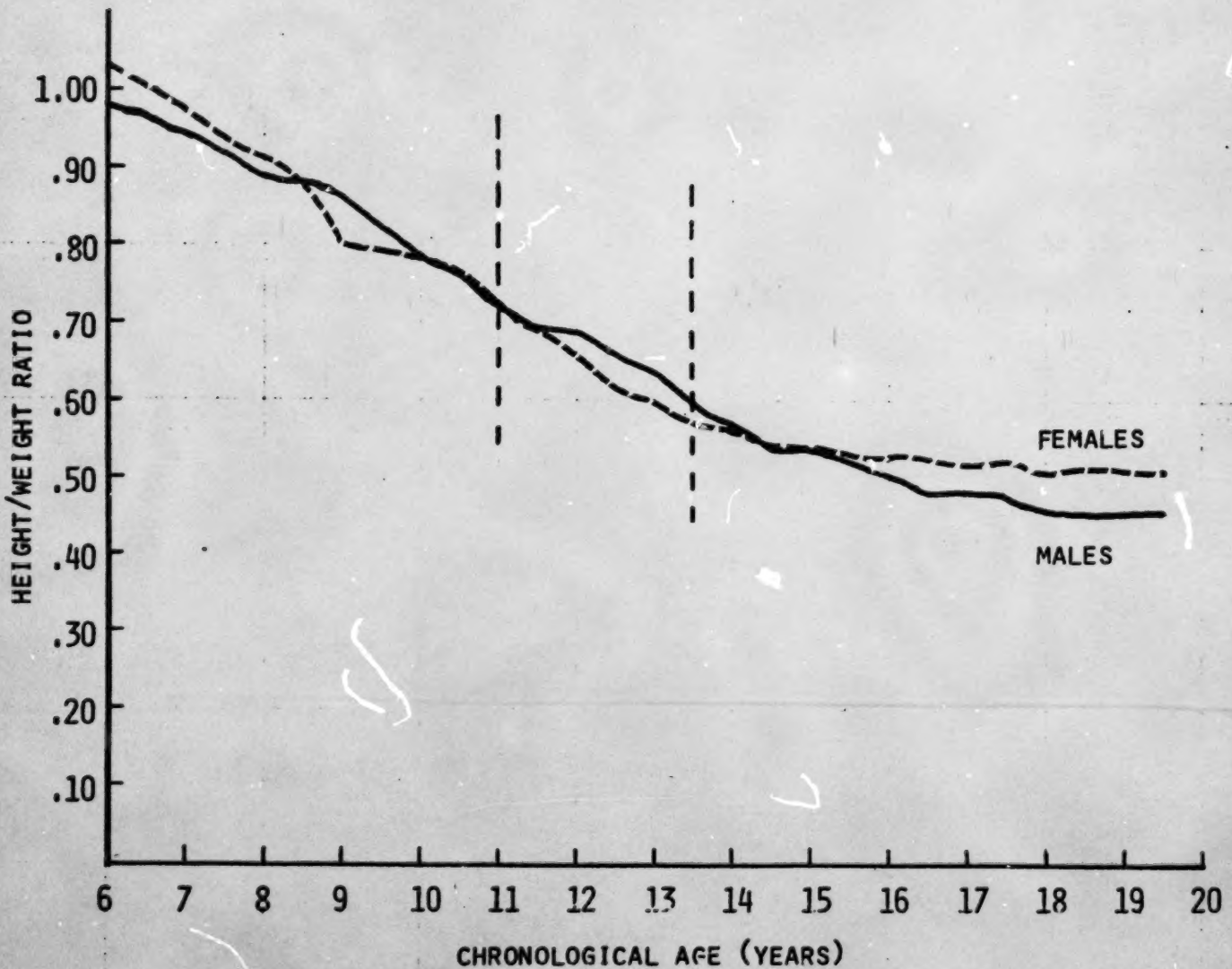
Table 1

Research Design

	Time of Measurement*		
	Time 1 May 1980	Time 2 Nov. 1980	Time 3 May 1981
TRANSITION GROUPS			
Grade 5 to 6 from Elementary to Middle School			
Longitudinal Sample	X	X	X
Control Group 1	0	X	X
Control Group 2	0	0	X
Grade 6 to 7 from Elementary to Junior High School			
Longitudinal Sample	X	X	X
Control Group 1	0	X	X
Control Group 2	0	0	X
NONTRANSITION GROUPS			
Grade 5 to 6 within Elementary School			
Longitudinal Sample	X	X	X
Control Group 1	0	X	X
Control Group 2	0	0	X
Grade 6 to 7 within Middle School			
Longitudinal Sample	X	X	X
Control Group 1	0	X	X
Control Group 2	0	0	X

* X = participation, 0 = nonparticipation



HEIGHT/WEIGHT RATIO CURVES FOR CHILDREN 6 TO 20 YEARS, BASED ON NATIONAL CENTER FOR HEALTH STATISTICS (50TH PERCENTILE)

Table 2

Repeated Measures Analysis of Variance
Significant Results Related to School Transition

Longitudinal Sample (N=226)

	Means of Mean Scores[a]		
	Time 1 (Pre-transition)	Time 2 (Post-transition)	Time 3 (Post-transition)
Teachers' Ratings of Children's Actual Competence[b]			
COGNITIVE COMPETENCE			
Time x Transition F (2,425) = 17.63****			
Transition Groups	3.44	3.09	3.02
Nontransition Groups	3.04	3.09	3.12
SOCIAL COMPETENCE			
Time x Transition F (2,411) = 25.44****			
Transition Groups	3.28	2.94	2.96
Nontransition Groups	2.86	3.31	3.14
Time x Grade x Transition F (2,411) = 4.73**			
Transition Groups			
Grade 5-6	3.27	3.02	3.06
Grade 6-7	3.29	2.76	2.87
Nontransition Groups			
Grade 5-6	3.10	3.21	3.19
Grade 6-7	2.70	3.38	3.09
PHYSICAL COMPETENCE			
Time x Transition F (2,381) = 10.83***			
Transition Groups	3.02	2.80	2.91
Nontransition Groups	2.73	2.90	3.04

Table 2 (cont'd)

Differences between Children's Perceptions and Teachers' Ratings[b] (Child minus Teacher Mean Scores)

COGNITIVE COMPETENCE			
Time x Transition F (2,425) = 8.22**			
Transition Groups	-.38	-.06	-.02
Nontransition Groups	-.16	-.15	-.21
SOCIAL COMPETENCE			
Time x Transition F (2,411) = 16.15****			
Transition Groups	-.34	.07	.08
Nontransition Groups	-.01	-.38	-.16
Time x Transition x Sex F (2,411) = 3.31*			
Transition Groups			
Males	-.16	.09	.20
Females	-.50	.05	-.05
Nontransition Groups			
Males	.05	-.22	-.09
Females	.06	-.51	-.34
Time x Grade x Transition F (2,411) = 3.76*			
Transition Groups			
Grade 5-6	-.27	.06	.04
Grade 6-7	-.40	.08	.11
Nontransition Groups			
Grade 5-6	-.18	-.13	-.15
Grade 6-7	.10	-.56	-.16
PHYSICAL COMPETENCE			
Time x Transition F (2,381) = 9.18****			
Transition Groups	-.28	.04	.00
Nontransition Groups	-.03	-.08	-.18

*$p < .05$, **$p < .01$, ***$p < .001$, ****$p < .0001$

a The means are based on 4-point scales.

b The degrees of freedom for tests of teacher rating effects vary with competence domains, because some teachers indicated they were unable to make judgments about certain children's social or physical competence.

Table 3

Repeated Measures Extreme Group Analysis of Variance[a]
Significant Results Related to Physical Maturity and School Transition

(n=55)

		Means[b]	
Children's Perceptions of their Competence			
COGNITIVE COMPETENCE		Males	Females
Physical Maturity x Sex			
F (1,39) = 4.57*	Less Mature	2.69	3.14
	More Mature	3.16	2.90
SOCIAL COMPETENCE			
Physical Maturity x Transition x Sex			
F (1,39) = 5.20*			
	Transition		
	Less Mature	2.61	3.18
	More Mature	2.93	2.76
	Nontransition		
	Less Mature	3.47	2.82
	More Mature	2.74	2.79
PHYSICAL COMPETENCE			
Physical Maturity x TRansition x Sex			
F (1,39) = 8.43**			
	Transition		
	Less Mature	2.29	2.91
	More Mature	3.01	2.22
	Nontransition		
	Less Mature	3.02	2.48
	More Mature	2.91	2.84
Physical Maturity x Grade x Sex			
F (1,39) = 7.28*			
	Grade 5-6		
	Less Mature	2.37	2.77
	More Mature	3.27	2.28
	Grade 6-7		
	Less Mature	3.08	2.62
	More Mature	2.73	2.68

	Time 1	Time 2	Time 3
Teachers' Ratings of Children's Actual Competence			
COGNITIVE COMPETENCE			
Time x Transition			
F (2,70) = 4.20*			
Transition	3.44	3.07	3.07
Nontransition	2.94	2.96	3.13

Table 3 (cont'd)

		Time 1	Time 2	Time 3
SOCIAL COMPETENCE				
Time x Transition				
F (2.70) = 11.68****	Transition	3.33	2.65	2.78
	Nontransition	2.94	3.21	3.23
Physical Maturity x Time x Sex				
F (2.70) = 3.67*	Males			
	Less Mature	3.30	2.90	2.90
	More Mature	2.83	3.06	3.07
	Females			
c	Less Mature	3.17	3.15	3.19
GENERAL COMPETENCE	More Mature	3.25	2.83	2.88
Physical Maturity x Time x Grade x Transition x Sex				
F (2,70) = 5.95*				
Differences between Children's Perceptions and Teachers' Ratings (Child minus Teacher Mean Scores)				
COGNITIVE COMPETENCE				
Time x Transition				
F (2,70) = 4.43*	Transition	-.32	.00	.10
	Nontransition	-.08	-.15	-.30
SOCIAL COMPETENCE				
Physical Maturity x Time x Transition				
F (2,70) = 5.18**				
	Transition			
	Less Mature	-.70	.03	.51
	More Mature	-.49	.55	.01
	Nontransition			
	Less Mature	.09	-.03	-.29
PHYSICAL COMPETENCE	More Mature	-.24	-.40	-.24
Physical Maturity x Time x Transition				
F (2,70) = 3.40*				
	Transition			
	Less Mature	-.83	-.31	-.09
	More Mature	-.40	.02	-.15
	Nontransition			
	Less Mature	-.18	-.21	-.69
c	More Mature	-.37	-.15	-.21
GENERAL COMPETENCE				
Physical Maturity x Time x Grade x Transition x Sex				
F (2,70) = 8.92**				

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*p < .05, **p < .01, ****p < .0001

a Included in the extreme group analyses were Longitudinal Sample subjects with a height/weight ratio 1 std. dev. from the mean at all three times of measurement within their Grade x Sex x Transition group.
b The means are based on 4-point scales.
c The 5-way interaction means are omitted.